



1995-96 KIRIS OPEN-RESPONSE ITEM SCORING WORKSHEET

Grade 8 — Science Question 1

The academic expectations applied in this item include:

2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.

2.3 Students identify and analyze systems and the ways their components work together or affect each other.

The core content assessed by this item includes:

Process

- Alternative explanations and predictions are recognized and analyzed.
- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such a displacement occurs, science advances.

Content

- Transfer of Energy
 - * Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.
 - * Heat moves in predictable ways, flowing from warmer objects to cooler ones until both objects reach the same temperature.

1. Temperature Differences

Suppose you often go for a bike ride in your community and you notice that there are slight temperature differences from place to place.

- Identify three or more possible causes for this and explain how these affect temperature.
- Given that these variations do occur, explain how you would determine an official temperature for your community if you had to provide data for a scientific study.

SCORING GUIDE

Score	Description
4	A. Student identifies three or more possible causes for temperature differences and explains how they affect temperature. B. Student also explains a realistic, relevant way to measure multiple readings at several sites and then averages these readings.
3	A. Student identifies two or more possible causes for temperature differences and explains how they affect temperature. B. Student also explains a realistic, relevant way to measure multiple readings. The student may exclude either several sites or may exclude averaging these readings.
2	A. Student identifies three possible causes for temperature differences and explains how they affect temperature. OR B. Student explains some method of data collection. OR Student makes a reasonable attempt at both part A and B.
1	A. Student identifies one or more possible causes for temperature differences. B. Not required.
0	Response is incorrect or irrelevant.
Blank	Blank/no response.

Causes:

Bodies of Water
Pavement
Landscape
Open Space

Buildings
Weather
Elevation
Industry

Location Relative to Mountains
High Elevation-Colder
Caves (Explained) to Desert (Unrealistic)



KIRIS ASSESSMENT ANNOTATED RESPONSE

GRADE 8 SCIENCE

Sample 4-Point Response of Student Work

Student identifies three possible causes for the temperature differences, i.e. proximity to a large body of water, amount of woodland area, and populated areas.

Student demonstrates an ability to recognize and analyze alternative explanations.

Student demonstrates an understanding that scientific explanations have logically consistent arguments and use scientific principles, models, and theories.

Student demonstrates a knowledge that energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.

I often go on many bike rides in my community and notice that there are slight temperature differences from place to place. I feel one reason this may occur is that certain sections of the community may be closer to a large body of water than others. This would affect the temperature by making it slightly cooler because when water evaporates it puts moisture into the air. The closer you are to that moisture, the cooler it often feels. Another possible reason for the temperature differences could be from the amount of woodland area surrounding me as I ride. Often as I ride by a large section of trees I notice the temperature drop slightly. The reason this happens is because the trees block some of the sun's rays, therefore blocking heat from the sun also. This then makes the temperature cooler.

Being in populated areas, such as the city also affect the temperature factories, cars and people themselves all produce heat. When all of these items are together and in large amounts, the heat is generated and often make a place feel warmer.

To provide data for a scientific study I would determine an official temperature for my community by gathering the temperature from the northern, southern, eastern and western boundaries of the community. I would also gather the temperature of the center of the community. I would then add the temperatures and divide by 5, which would give me the average temperature that would be the temperature I used.

Student demonstrates a knowledge that heat moves in predictable ways, flowing from warmer objects to cooler ones until both objects reach the same temperature.

Student restatement of the question is **not** necessary.

Student explains how each of the causes could affect the temperature, i.e. moisture in the air, shade, and heat producers.

Student explains a realistic, systematic way to determine an official temperature by taking readings at several specific geographically located sites and then averaging the readings

Student demonstrates an application of scientific ways of thinking and working and uses those methods to solve real-life problems.

Student demonstrates an application of systems and the ways their components work together or affect each other.



KIRIS ASSESSMENT ANNOTATED RESPONSE

GRADE 8 SCIENCE

Sample 3-Point Response of Student Work

Student identifies two possible causes for the temperature differences, i.e. pavement/grass and pollution.

Student's restatement of the question is **not** necessary.

Student explains how each of the causes could affect temperature, i.e. absorption of heat and trapping/blocking heat.

Student demonstrates an ability to recognize and analyze alternative explanations.

If I often went on bike rides in my community and I noticed different changes in temperatures, I could make some guesses about what the possible reasons for this could be. One reason for this change could be that one of the places traveled to has more pavement or more grassy areas than the other. Pavement attracts heat and grass doesn't, therefore if a certain place has lots of pavement, it has a chance of being hot. Something else could be that one of the areas has more pollution from factors and automobiles. This kind of pollution can either trap heat or block it out. Now, if I wanted to keep an official temperature for my community, I could go at this by setting up several thermometers around my community and go out and check them at certain times of the day, then take an average on the readings I get.

Student demonstrates an application of scientific ways of thinking and working and uses those methods to solve real-life problems.

Student demonstrates an understanding that scientific explanations have logically consistent arguments and use scientific principles, models, and theories.

Student demonstrates an application of systems and the ways their components work together or affect each other.

Student explains a realistic way to determine an official temperature by taking readings at several sites, at multiple times of the day, and then averaging the readings.

Student demonstrates a knowledge that heat moves in predictable ways, flowing from warmer objects to cooler ones until both objects reach the same temperature.

Student demonstrated a knowledge that energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.



KIRIS ASSESSMENT ANNOTATED RESPONSE

GRADE 8 SCIENCE

Sample 2-Point Response of Student Work

Student identifies three possible causes for the temperature differences, i.e. riding toward the wind, riding with the wind, and humidity.

If you are riding towards the wind, with the wind, humidity changes from place to place. To determine an official temperature for your community if I had to provide data for a scientific study, first I would walk around record various temperatures and average them to find the most accurate temperature in my community.

Student does **not** explain how each of these causes could affect temperature.

Student explains a method to collect data by walking around and recording temperatures, (i.e. it implies several sites) and then averages them.

Student demonstrates some ability to recognize and analyze alternative explanations.

Student demonstrates some knowledge that heat moves in predictable ways, flowing from warmer objects to cooler ones until both objects reach the same temperature.

Student demonstrates some application of scientific ways of thinking and working and uses those methods to solve real-life problems.

Student demonstrates some understanding that scientific explanations have logically consistent arguments and use scientific principles, models, and theories.

Student demonstrates some knowledge that energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.

Student demonstrates some application of systems and the ways their components work together or affect each other.

Sample 1-Point Response of Student Work

Student identifies one possible cause of the temperature differences, i.e. humidity.

One of the differences might be humidity.

Student does **not** explain a method to determine an official temperature.

Student does **not** explain how this cause could affect temperature

INSTRUCTIONAL STRATEGIES

Temperature Differences

Students investigate how topography influences changes in weather and temperature.

Students investigate how there might be a temperature difference between the deep and the shallow water in a swimming pool system.

Students investigate the effects on melting rates when placing ice cubes in different locations.

Students determine the relationship between the angle of incidence of light on a surface and the rate of temperature change. Students use blocks of wood with a thermometer taped to each one, set the blocks at varying angles, measure the temperature, construct tables to display the information, and compare the results.

Students place equally spaced wax beads on a rod or bar (copper, iron, aluminum, glass, etc.) and heat one end of the bar. Students construct a data table, collect data concerning the time it takes each bead to melt, and then make a graph from the data.

Students design an experiment to determine the rate of diffusion of food coloring in water at several temperatures and explain (in writing) their observations.

Students practice reading thermometers, record class temperature data over a period of time, then make a class temperature graph. Students then investigate temperature differences outdoors.